Brief Summary Document of Phenix Magnet Dimensions and Parameters

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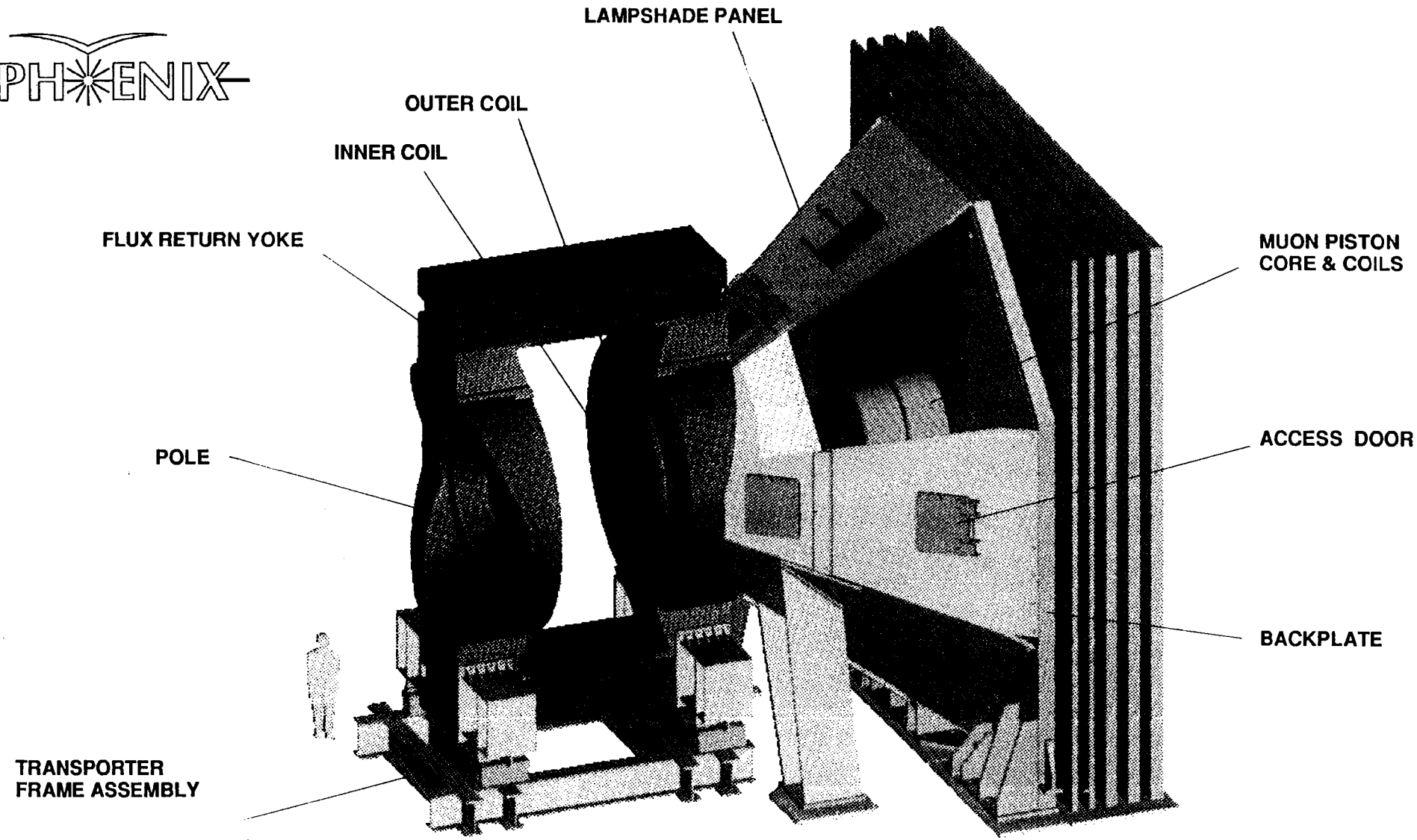
PHENIX Magnet Subsystem



The PHENIX Magnet Subsystem and Mu ID Steel

- PHENIX has two major magnet subsystems. The Central Magnet (CM) and the Muon Magnet (MM).
- The CM is 9 meters tall and weighs nearly 500 tons.
- The CM single particle resolution is better than 1% between 200 MeV and 1 GeV.
- One pole of the CM serves as the primary absorber of hadrons for the μ arm spectrometer. This required careful optimization of the CM pole face and the neutron and gamma ray absorbers.
- The MM is 10 meters tall and weighs more than 400 tons.
- It has sufficient resolution to resolve the Ψ' from the J/Ψ and the Υ(1S) from the Υ(2S+3S).
- The Mu ID steel is part of the muon detector but is integrated with the magnet components for design, structure, and schedule reasons.
- The Mu ID steel is 10 meters tall and weighs more than 600 tons.

The Central Magnet

- The CM is an axial field magnet energized by two pairs of concentric coils, which can be run separately, together, or in opposition.
- It covers a rapidity interval of $\pm$ 0.35 units.
- $\int B \cdot dl$ = 0.78 Tesla - m
- Minimum field in the RICH region to avoid distortion of tracks $\Leftrightarrow$ rings.

  $\int B \cdot dl$ = 100 gauss - m (from 2.4 to 4 meters radius)
- Minimum field at the outer radius of the CM pole where RICH phototubes will be mounted.

  $B_{Tot} \leq$ 200 gauss.
- Field near the EM Cal $\leq$ 10 gauss.

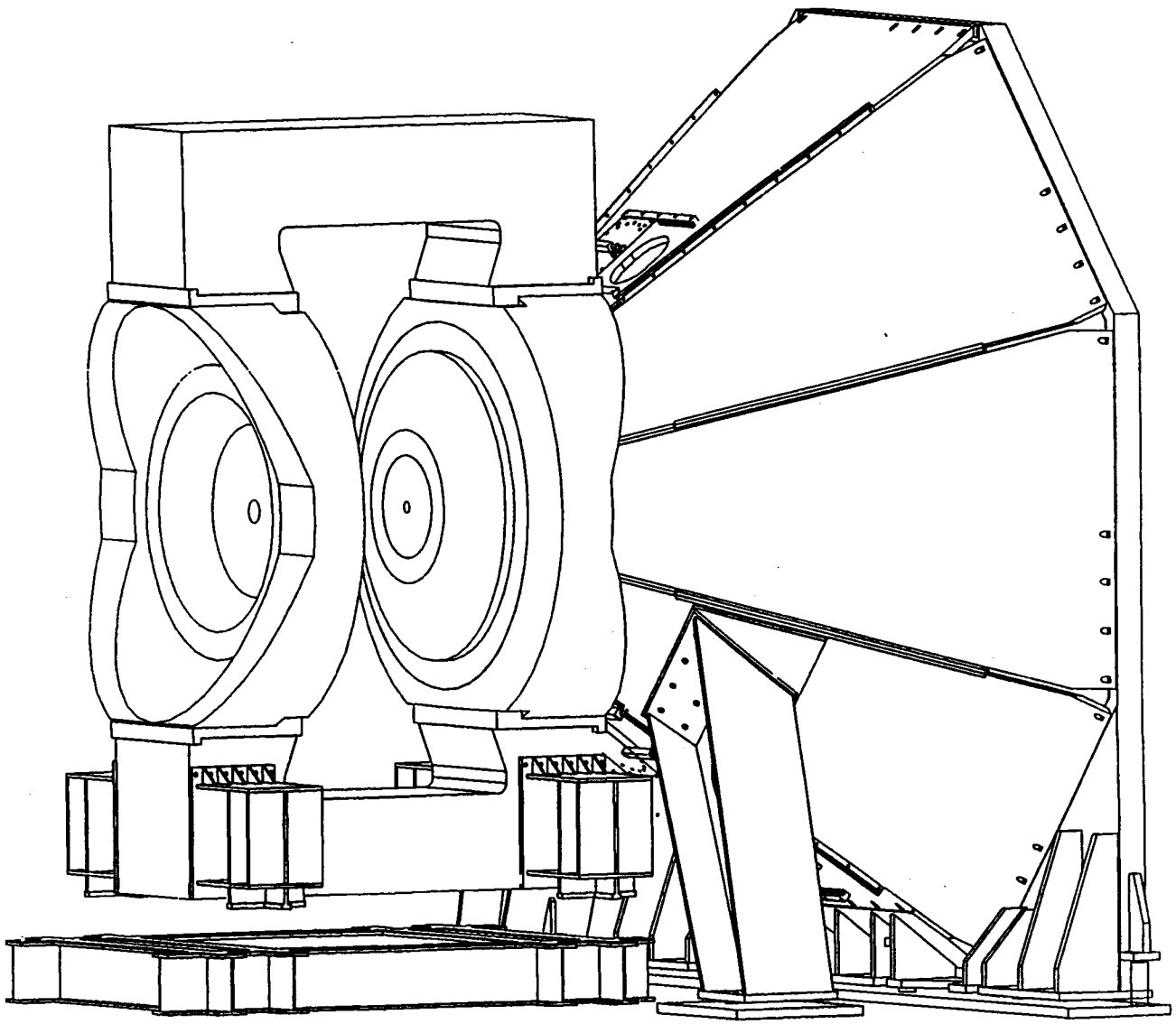
The Muon Magnet

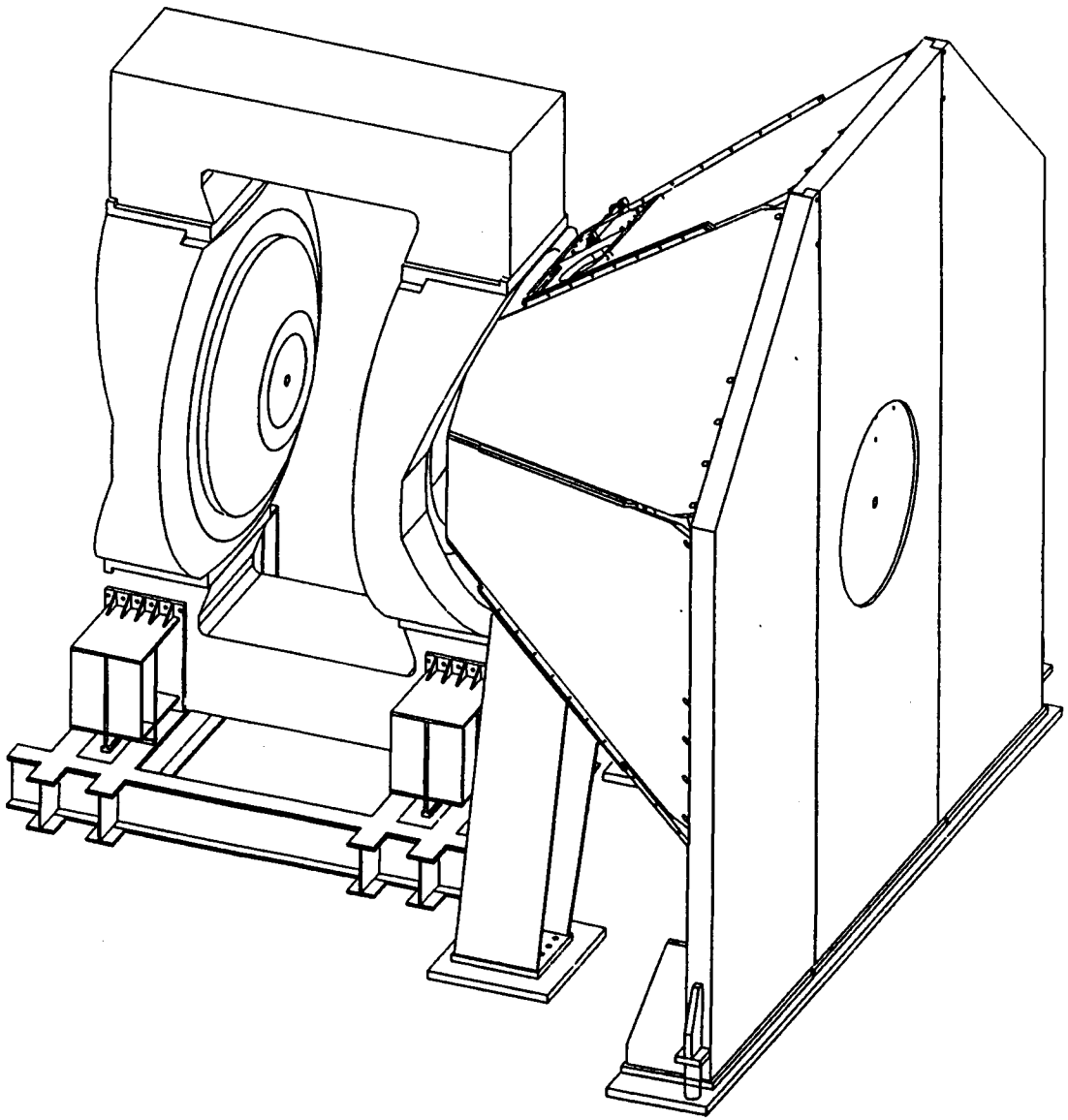
- The MM uses two solenoidal coils to produce a radial magnetic field. The coils are wound around a tapered piston, the flux propogates out to the lampshade and returns via a 30 cm thick endplate.
- It covers a rapidity interval of 1.1 - 2.4 units (10° to 37°).
- It has large acceptance in ϕ angle for low cross-section measurements.
- P_T kick of $\approx$ 200 MeV

  $\int B_R \bullet dl$ = 0.72 Tesla - m (along a line 15° from the beam axis).

The Mu ID Steel

- The Mu ID steel is part of the muon detector but is integrated with the magnet components for design, structure, and schedule reasons.
- The Mu ID steel and Mu ID detectors cause the hadrons to shower and still identify the straight through tracks of the muons.
- The 30 cm thick endplate for the MM is the first layer of the Mu ID absorber.
- The Mu ID absorber consists of 5 more layers of steel:
  10 cm, 10 cm, 20 cm, 20 cm, 20 cm
  each 10 m high and 10 m wide.
- It weighs over 600 tons.
- It fits. The distance between the back of the MM and the far wall is less than 3 meters!


Y
Z
X


Y
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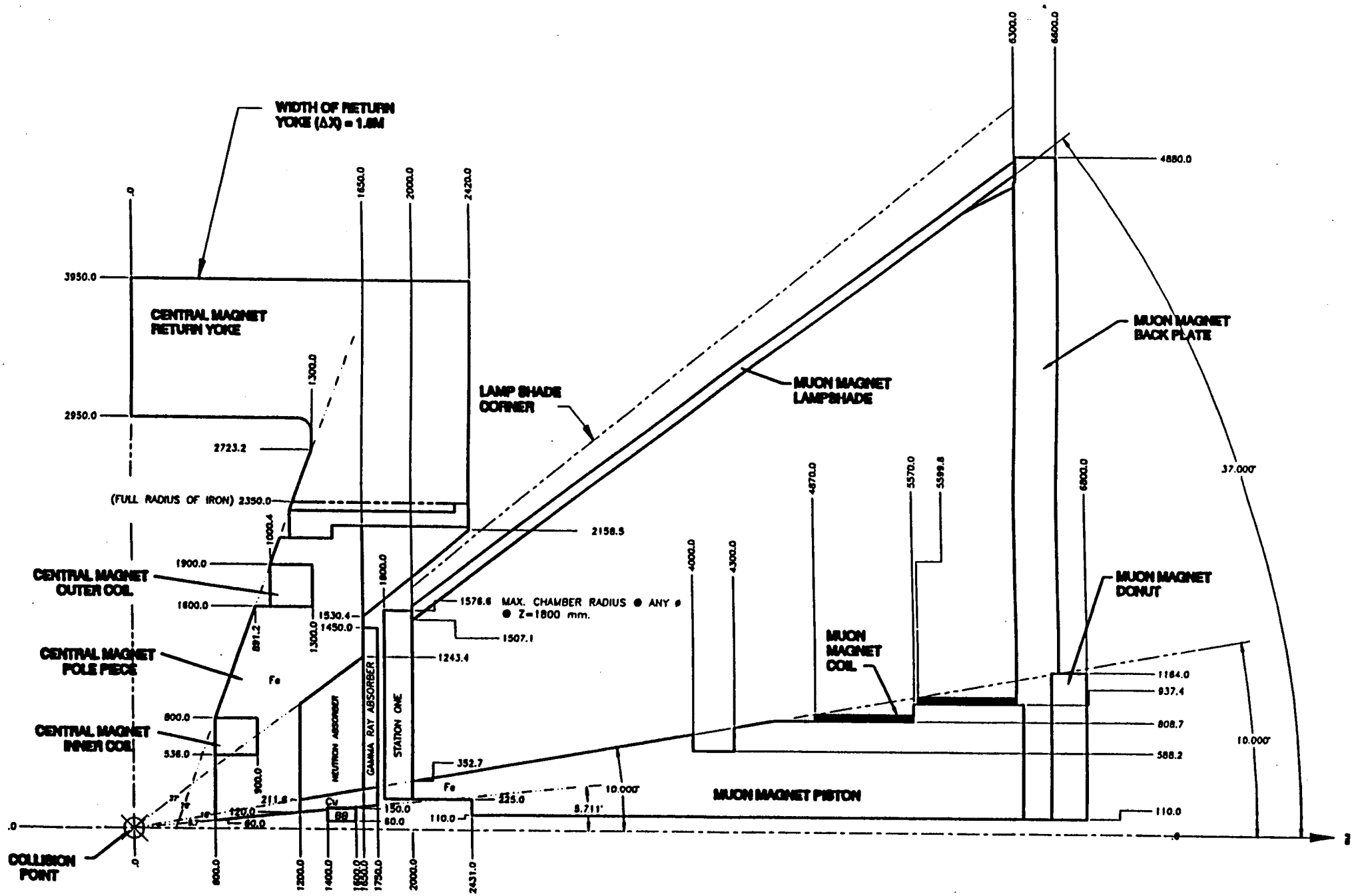
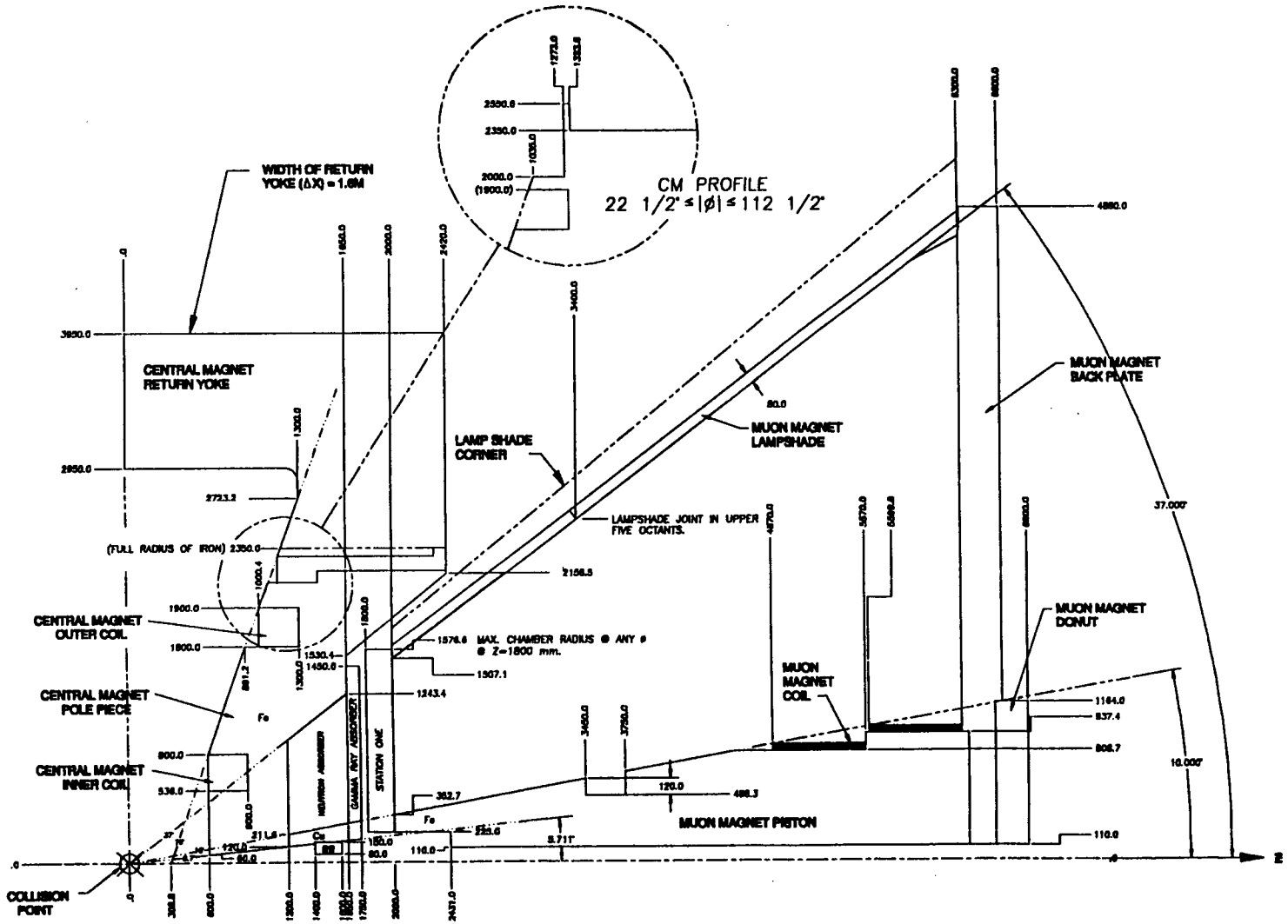

WIDTH OF RETURN YOKE (ΔX) = 1.6M
CENTRAL MAGNET RETURN YOKE
LAMP SHADE CORNER
MUON MAGNET LAMPSHADE
MUON MAGNET BACK PLATE
CENTRAL MAGNET OUTER COIL
CENTRAL MAGNET POLE PIECE
CENTRAL MAGNET INNER COIL
MUON MAGNET COIL
MUON MAGNET DONUT
MUON MAGNET PISTON
1576.6 MAX. CHAMBER RADIUS ● ANY ø ● Z=1800 mm.
(FULL RADIUS OF IRON) 2350.0
2158.5
1507.1
1243.4
352.7
NEUTRON ABSORBER
GAMMA RAY ABSORBER
STATION ONE
Fe
Cu
BB
37.000'
10.000'
8.711'
COLLISION POINT

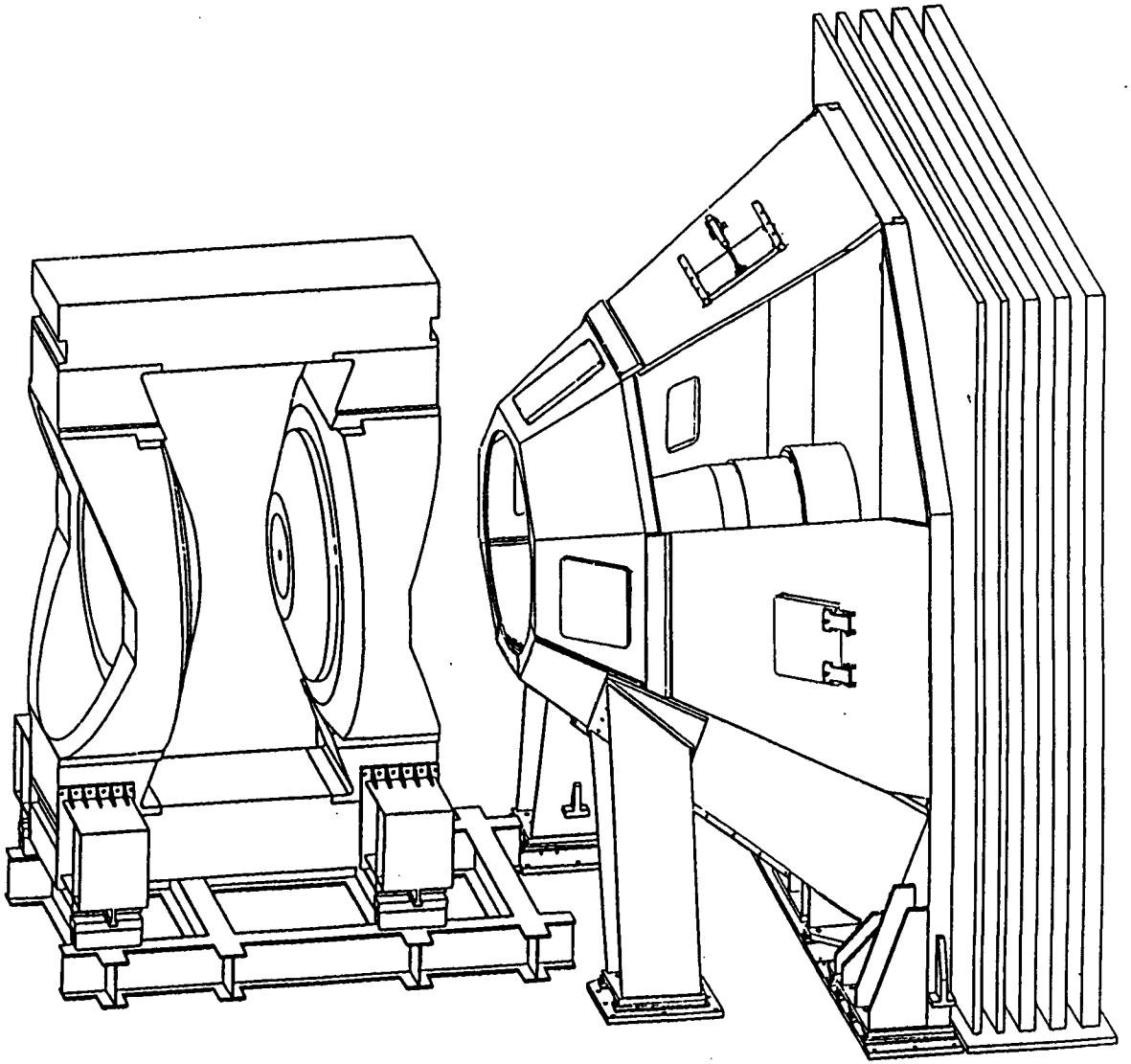
PHENIX Mag. Sys. - Configuration Control Dwg.



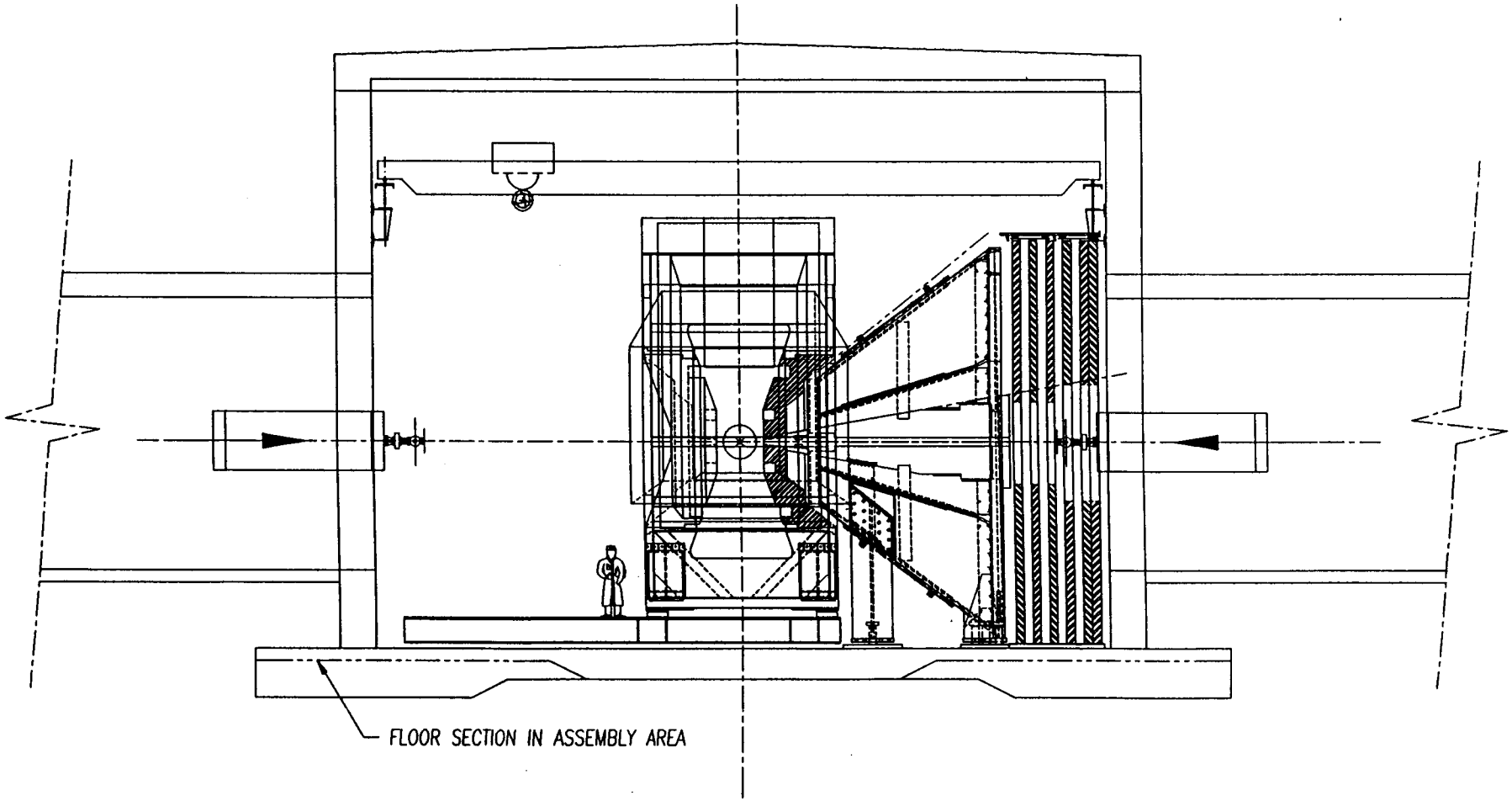
PHENIX/REF_DRAWING
09/21/1993

RMY-01
10/24/93

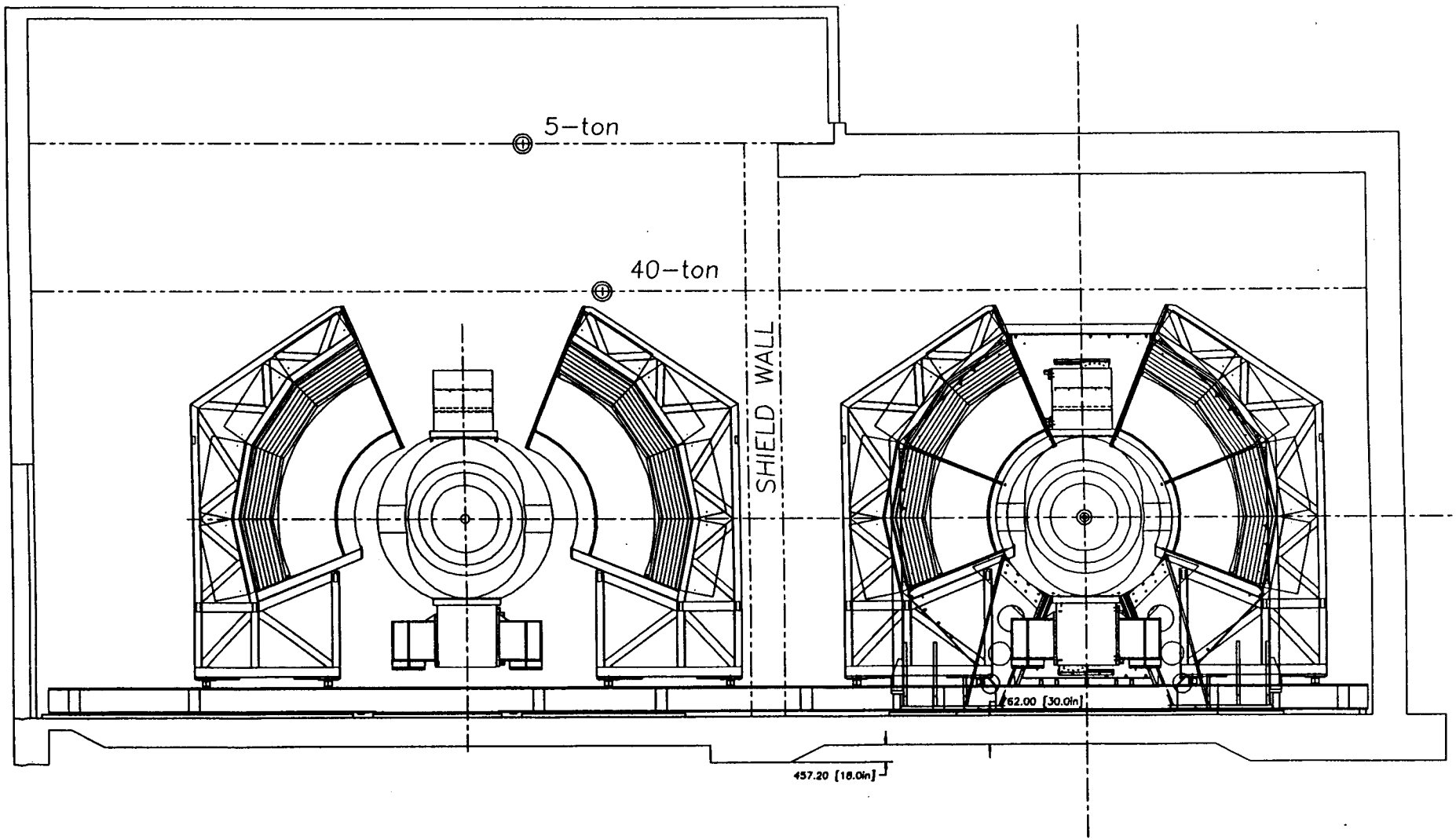
Central Magnet retracted 1.5 m



PHENIX hall track system (X elevation



PHENIX hall track system (Z elevation)



PHENIX hall track system